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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/895,689	06/29/2001	Huitao Luo	10011098	6870

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HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, CO 80527-2400

EXAMINER

LAROSE, COLIN M

ART UNIT	PAPER NUMBER
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2627

DATE MAILED: 10/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/895,689

Applicant(s)

LUO, HUITAO

Examiner

Colin M. LaRose

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5 July 2005 has been entered.

Response to Amendments and Arguments

2. Applicant's amendments and corresponding arguments for claims 1, 11, and 18 are sufficient to overcome the previous 102(b) rejection in view of Nakai. Therefore, the previous rejection of those claims has been withdrawn. However, a new ground of rejection is set forth below.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 11, and 18 recite that "optimal ranges, instead of optimal values, combined in a system energy formulation" are utilized. Examiner is aware that this language is taken verbatim

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from paragraph [0051] in the Specification. However, in paragraph [0053], equation (2) defines Applicant's energy function. In the description that follows in paragraph [0054], the variables utilized in the energy function are said to represent optimal values – e.g. optimal mean values $L_f^{o(i)}$ and $L_p^{o(i)}$ and optimal lightness values L_f^o and L_p^o .

The claims specify that optimal ranges are utilized rather than optimal values. This seemingly contradicts the above-cited passage in the Specification, which states that optimal values are in fact utilized. Clarification of this discrepancy and/or correction of the claim is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-3, 11-13, 18, 19, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,535,301 by Kuwata et al. ("Kuwata") in view of U.S. Patent 5,497,431 by Nakamura.

Regarding claims 1, 11, and 18, Kuwata discloses a computer-implemented method (figure 5) for enhancing image quality of an original digital image having initial image quality issues comprising the steps of:

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a) locating skin areas within said original digital image having initial image quality issues, said original digital image captured during a picture capture stage by a digital camera (e.g. 12, figure 2);

b) analyzing said digital image, said analysis including including analysis of said digital image as a whole (step S100 -- see column 15, lines 30-63: the whole image is analyzed in order to detect the pixels that exhibit skin colors; those pixels are designated as "object pixels"); and analysis of said skin areas located in step a) (step S110 -- see column 16, lines 33-51: each object pixel is analyzed to determine whether each object pixel is applicable (denoted by the applicability parameter k) to the specified image processing operation);

c) utilizing said analysis of said skin areas located in step a) and using said analysis of said image as a whole to determine a tone mapping function for enhancing the image quality of said original digital image (step S120 and column 17, lines 28-61: a contrast enhancement mapping (e.g. figure 17) is determined for the object pixels based on the determined applicability k of each object pixel), said tone mapping function utilizing optimal ranges, instead of optimal values, combined in a system energy formulation (column 17, line 32 through column 18, line 42: the tone mapping utilized to enhance the image contrast is based on optimal ranges of luminance values, such as 5-250 shown in figure 16, rather than any optimal luminance values; the optimal range is representative of the mapped energy distribution of the image, as shown in figure 15); and

applying said tone mapping function determined in step c) to said digital image so as to produce an enhanced digital image different from said original digital image (step S120 -- the image data is converted according to the tone mapping of figure 17), wherein a mapped deviation

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of the human skin areas of the enhanced digital image is greater than the deviation of the human skin areas of the original digital image (figure 15 shows that the standard deviation of the mapped pixels after contrast enhancement is greater than the standard deviation of the original pixels before contrast enhancement).

Kuwata discloses locating human skin regions in the original image, rather than specifically human face regions, as claimed.

Nakamura discloses an image processing system similar to that of Kuwata wherein specific image regions are extracted and then subject to enhancement. In particular, Nakamura discloses extracting human face regions because “when a photograph is viewed, the area which is most noticed is the person’s face, [and] in order to produce high-quality photographs, it is necessary to print the color and the density of a human face at an appropriate color and an appropriate density” (column 1, lines 26-30). Therefore, Nakamura devised a system (e.g. figures 1 and 10) that extracts face regions from an original image and utilizes information pertaining to the face regions in order to enhance the image.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kuwata by Nakamura in order to locate and analyze facial regions, as claimed, rather than skin regions, as taught by Kuwata, since Nakamura teaches that facial regions carry a high physiological importance to viewers, and it is therefore advantageous to enhance the quality of facial regions to achieve a more pleasing image.

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Regarding claims 2, 12, and 19, the combination of Kuwata and Nakamura teaches a system that performs the claimed method automatically.

Regarding claims 3 and 13, Nakamura teaches applying a face detection algorithm for locating human faces (e.g. figure 2).

Regarding claim 23, Kuwata discloses generating a look-up table that corresponds to a tone mapping curve (see e.g. figure 16).

Regarding claim 24, Kuwata discloses applying the one properties within said lookup table to said digital image, as claimed (i.e. the look-up table in figure 16 is used as a tone conversion table).

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,535,301 by Kuwata et al. ("Kuwata") in view of U.S. Patent 5,497,431 by Nakamura, as applied to claim 1, and further in view of .

Regarding claim 10, Kuwata discloses converting RGB image data into chrominance components for the purposes for detecting skin areas and into a luminance component for correcting the tone of the image. However, Kuwata does not expressly disclose converting the image to and from an Lab format before and after the enhancement processing, as claimed.

Takiguchi discloses a system for enhancing images similar to that of Kuwata. In particular, Takiguchi discloses converting an RGB image into an Lab (e.g. Luv) format prior to enhancement processing and converting the enhanced Luv image back into RGB after processing has concluded. See figure 1. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kuwata to convert the image to and from an Lab format, as

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claimed, since Takiguchi shows that such conversion enables homogeneously-colored region to be located easily and luminance corrected to be easily implemented due to the characteristics of the Lab color space.

Allowable Subject Matter

8. Claims 4-9, 14-14, and 20-22 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Regarding claims 4, 14, and 20, Kuwata does not disclose or suggest that the tone mapping function comprises combining both psychological factors and signal factors, as claimed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colin M. LaRose whose telephone number is (571) 272-7423. If attempts to reach the examiner by telephone are unsuccessful, the examiner's acting supervisor, Bhavesh Mehta, can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2600 Customer Service Office whose telephone number is (571) 272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

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may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CML
Group Art Unit 2627
6 October 2005



VIKKRAM BALI
PRIMARY EXAMINER